What is Claimed is:

1. A method for controlling a physical variable at a frequency of interest ($f_d$) including the steps of:

a) sampling the physical variable at a sample frequency less than twice the frequency of interest ($f_d$);

b) calculating at least one control command based upon the sampling of the physical variable; and

c) generating a force for controlling the physical variable based upon the control command.

2. The method of Claim 1, further including the steps of:

bandpass filtering the physical variable prior to said step a).

3. The method of Claim 2 wherein said bandpass filter extracts a frequency range with a lower bound generally given by $(2n-1)*f_s/2$ and an upper bound generally given by $(2n+1)*f_s/2$, where n is an integer chosen so that the frequency of interest ($f_d$) is within the extracted frequency range.

4. The method of claim 1 wherein said physical variable includes information within a bandwidth including said frequency of interest and wherein said sampling rate is at least twice the bandwidth of this information.

5. The method of claim 1 further including the step of generating the at least one control command at a rate less than twice the frequency of interest.

6. A method for computing control commands at a reduced rate in a noise or vibration control system including the steps of:

a) sensing a physical variable;

b) identifying harmonic components ($a_k$, $b_k$) of the physical variable at a frequency of interest ($f_d$);

c) down-sampling the harmonic components ($a_k$, $b_k$) to a lower update frequency ($f_u$);

d) performing control computations on the harmonic components($a_k$, $b_k$) at the lower update frequency ($f_u$ ); and

e) generating control commands based upon the control computations.

7. The method of Claim 6 further including the step of:

f) generating harmonic components of the control commands in said step e).

8. The method of Claim 7, further including the step of:

g) generating a control output at a frequency higher than the lower update frequency.

9. The method of Claim 6 further comprising:

low-pass anti-aliasing filtering to prevent aliasing in sampling at a lower update frequency ($f_u$).

10. The method of Claim 6, further comprising:

obtaining estimates of the harmonic components by computing a fast-Fourier transform of the physical variable; and

extracting the result corresponding to the frequency of interest ($f_d$).

11. The method of Claim 6, wherein said physical variable comprises a plurality of physical variables, said method further including the steps of:

f) generating a sensed signal as a function of each of said plurality of physical variables; and

g) computing harmonic estimates $z_k$ for each sensed signal $y_k$ at each sample time $t_k$ according to $z_k=z_{k-1} +\rho H(y_k-H^T z_{k-1})$, where:

$H=[\ 1 \cos (f_d\ t_k) \sin(f_d\ t_k) \cos(f_x t_k) \sin(f_x t_k), \ldots]^T$ and where:

$f_d t_k$= desired frequency;

$f_x t_k$= frequency of unwanted information in $y_k$;

$z_k$ = estimates of harmonic content of $y_k$ at time k;

$z_{k-1}$ = estimates of harmonic content at time k-1;

$\rho$= a variable gain that determines the corner frequency of the first order low-pass anti-aliasing filter;

$y_k$ = sensed signal vector at time k;

$(\cdot)^T$= transpose of a vector or matrix.

12. The method of Claim 11, further comprising

utilizing every $N^{th}$ harmonic estimator output $z_{Nk}$ where N is the ratio of the sampling frequency and the update frequency ($f_s/f_u$).

13. The method of Claim 11, further comprising:

generating separate control commands for each of multiple tones;

adding control commands for each tone; and

outputting a sum of the control commands for each tone to one or more force generators.

14. A method for analyzing a physical variable having a first frequency of interest $f_l$ and a second frequency of interest $f_2$ including the steps of:

a) identifying first harmonic components $a_{k1}$, $b_{k1}$ of the first frequency of interest $f_l$;

b) down-sampling the harmonic components $a_{k1}$, $b_{k1}$ at an intermediate frequency $f_{u1}$;

c) identifying second harmonic components $a_{k2}$, $b_{k2}$ of a difference between the first frequency of interest $f_l$ and the second frequency of interest $f_2$;

d) downsampling the harmonic components $a_{k2}$, $b_{k2}$at an update frequency $f_{u2}$; and

e) analyzing information at the first frequency of interest $f_l$ and the second frequency of interest $f_2$based upon said harmonic components $a_{k1}$, $b_{k1}$ and $a_{k2}$, $b_{k2}$.

15. The method of Claim 14 wherein the intermediate frequency $f_{u1}$ is higher than the update frequency $f_{u2}$.

16. The method of Claim 14 further including the steps of:

f) generating control signals at the update frequency $f_{u2}$ based upon said step e).

17. An apparatus for sensing physical variables at a reduced rate comprising:

a sensor adapted to sense physical variables and to generate a sensed signal as a function of the sensed physical variable; and

a control circuit adapted to establish a frequency of interest ($f_d$), and to establish a sample frequency ($f_s$),

wherein the control circuit filters the sensed signals to extract a frequency range with a lower bound given by $(2n-1)*f_s/2$ and an upper bound given by $(2n+1)*f_s/2$, where n is an integer chosen so that the frequency of interest ($f_d$) is within the extracted frequency range.

18. The apparatus of Claim 17, wherein the control circuit attenuates the filtered sensed signal at a frequency less than the frequency of interest ($f_d$) by high-pass anti-aliasing to produce a resultant signal.

19. The apparatus of Claim 17 wherein the control circuit aliases the filtered sensed signal to a lower frequency when there is no information present at the lower frequency in the sensed signal and the control circuit extracts desired information.